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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
NGUYEN, KIMBINH T	

ART UNIT	PAPER NUMBER
2671	

DATE MAILED: 09/28/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/921,681	RITTER ET AL.	
	Examiner	Art Unit	
	Kimbinh T. Nguyen	2671	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 July 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-25 and 27-54* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *1-18 and 52* is/are allowed.

6)☒ Claim(s) *19-25,27-51,53 and 54* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

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DETAILED ACTION

1. This action is responsive to Appeal Brief filed 07/21/05.

2. Claims 1-25, 27-54 are pending in the application.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 19-25 are rejected under 35 U.S.C. 102(e) as being anticipated by Malzbender et al. (6,654,013).

Claim 19, Malzbender et al. discloses a graphics processor (14) and display (20; fig. 1), comprising: a parametric texture map (parametric texture map 16) executable by the graphics processor (graphics processor 14; fig.1), wherein said parametric texture map models a surface reflectance function defining surface reflectance properties for a surface structure (the graphics processor 14 maps the surface structure defined in the parametric texture map 16; col. 3, lines 52-55); wherein the surface reflectance function comprises a Bidirectional Reflectance Distribution Function (the reflectance properties of the surface can be characterized by its BRDF; col. 2, lines 53-56).

Claims 20-22, Malzbender et al. teaches parametric texture map comprises at least four independent variables (Du, Dv, DuDv, Du, Dv, see equation 2, col. 3, line 64

through col. 4, line 4); parametric texture map comprises at least two independent variables for defining a light direction vector for surface (Lu, Lv; col. 5, lines 19-21); parametric texture map comprises at least two independent variables for defining a view direction vector for surface reflectance properties (Vu and Vv; col. 5, lines 17-18).

Claim 23, Malzbender et al. teaches parametric texture map comprises at least two independent variables for defining a half-angle vector for the surface (Hu, Hv; col. 5, lines 20-21).

Claim 24, Malzbender et al. teaches parametric texture map comprises at least two independent variables (u,v) for defining a difference vector for surface reflectance properties (a different light source vector; col. 7, lines 24-47) .

Claim 25, Malzbender et al. teaches the graphic processor 14 renders the surface in real-time (bilinear, trilinear interpolations; col. 6, lines 11-23).

5. Claims 27-31 are rejected under 35 U.S.C. 102(e) as being anticipated by Kouadio (6,765,573).

Claim 27, Kouadio discloses a texture map data structure including a function for representing a texture map of texels (BRDF; col. 6, lines 60-67); function evaluating at least two independent variables for defining an illumination vector ((evaluation of diffuse and specular components; col. 5, lines 33-34) and two independent variables for defining a view vector (view vector V and the normal direction vector N; col. 5, lines 49-54).

Claim 28, Kouadio discloses texture map data structure models a surface reflectance function for a surface structure (col. 4, lines 7-21).

Claim 29, Kouadio does not teach teaches plurality of coefficients defining lighting characteristics for varying views of the respective texel; Collodi teaches parametric texture map comprises a plurality of texels and wherein parametric texture map further comprises a plurality of coefficients for each texel, plurality of coefficients defining lighting characteristics for varying views of the respective texel (the diffuse coefficient cd; the specular light coefficients; col. 10, lines 31-67). It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the plurality of coefficients taught by Collodi into the texture map of Kouadio, because it would be useful for specular light sources which often possess intensity variation characteristic unique to the light source and surface composition; col. 10, lines 61-64).

Claims 30 and 31, Kouadio discloses calculating texel display value using the texture map data to render a 3D object by the texture map data (col. 16, lines 13-21).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 32-51, 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kouadio (6,765,573) in view of Collodi (6,833,830).

Claim 32, Kouadio discloses a texture map data structure including a function (BRDF; col. 4, lines 7-21) and Collodi teaches the function evaluating at least two independent variables for defining a half angle vector (vector S which also referred to as the halfway vector H can be calculated by normalizing the vector sum of the view and light source vectors; col. 5, lines 33-35; col. 6, lines 1-5) and at least two independent variables for defining a difference vector (the difference vectors d1 and d2; col. 10, lines 31-43). It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate calculating a halfway angle and different vectors taught by Collodi into Kouadio for defining a half-angle and difference vectors, because it would provide a computationally more efficient process and apparatus for producing a high quality 3D image (col. 2, lines 37-39).

Claim 33, Kouadio discloses texture map data structure models a surface reflectance function for a surface structure (col. 4, lines 7-21).

Claims 34 and 35, Kouadio discloses calculating texel display value using the texture map data to render a 3D object by the texture map data (col. 16, lines 13-21).

Claims 36 and 39, Kouadio teaches using a texture map that includes a function (BRDF function parameters) for use in rendering a digital image having surface reflectance properties (a surface with its characteristic light reflectance; col. 3, line 64 through col. 4, line 21), wherein the function evaluates more than two variables directed to surface reflectance properties (computing diffuse and specular components; normal vector computation; col. 8, line 51 through col. 10, line 67). Kouadio teaches method computes and stored light reflectance values as texture map for a given light direction

and view direction to an object by a selected bidirectional reflectance distribution function (BRDF) for rendering a digital image (abstract) which related to a texture map function as claimed. It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the BRDF texture map taught by Kouadio for computing light reflectance values, because the BRDF are the most accurate in terms of rendering quality, as a result it would obtain highly textured surfaces during real-time rendering (abstract).

Claims 37, 40, Kouadio teaches the function evaluates at least two independent variables for defining an illumination vector (light vector L) and at least two independent variables for defining a view vector (view vector V; col. 10, lines 1-29).

Claims 38 and 41, Kouadio does not teach a difference vector. Collodi teaches parametric texture map evaluates at least two independent variables for defining a half-angle vector (vector S which also referred to as the halfway vector H can be calculated by normalizing the vector sum of the view and light source vectors; col. 5, lines 33-35; col. 6, lines 1-5) and at least two independent variables for defining a difference vector (the difference vectors d1 and d2; col. 10, lines 31-43). It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate calculating a halfway angle and different vectors taught by Collodi into Kouadio for defining a half-angle and difference vectors, because it would provide a computationally more efficient process and apparatus for producing a high quality 3D image (col. 2, lines 37-39).

Claims 42-44, the rationale provided in the rejection of claims 36 and 38 are incorporated herein.

Claim 45, Kouadio teaches texture map includes a BRDF for use in rendering a digital image (col. 4, lines 47-50), wherein the BRDF includes more than two variables relating to surface reflectance propertied of the digital image (light vector L, view vector V and direction vector N; col. 5, lines 49-65).

Claims 46-48, Kouadio teaches more than two variables are selected from the group consisting of: variables for defining an illumination, variables for defining a view vector, variables for defining a half vector and variables for defining a difference vector (light direction L vector, view direction V vector; col. 10, line 2). Kouadio does not teach a difference vector. Collodi teaches parametric texture map evaluates at least two independent variables for defining a half-angle vector (vector S which also referred to as the halfway vector H can be calculated by normalizing the vector sum of the view and light source vectors; col. 5, lines 33-35; col. 6, lines 1-5) and at least two independent variables for defining a difference vector (the difference vectors d1 and d2; col. 10, lines 31-43). It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate calculating a halfway angle and different vectors taught by Collodi into Kouadio for defining a half-angle and difference vectors, because it would provide a computationally more efficient process and apparatus for producing a high quality 3D image (col. 2, lines 37-39).

Claim 49, Kouadio teaches computer executable software code stored to a computer-readable medium 9col. 1, lines 27-60); the software comprising: receiving at

least four independent surface reflectance property variables (view vector V, light source vector L or half-angle vector H (col. 10, lines 4-10); tangent and Bi-normal vectors: T,B, N); using a function included in a texture map (parametric texture map; col. 4, lines 63-67) for rendering a digital image, wherein the function evaluates four independent surface reflectance property variables to render the digital image having proper surface reflectance properties (diffuse and specular components, light vector, view vector, normal direction vector N; col. 5, lines 33-65).

Claims 50, 51, the rationale provided in the rejections of claims 43, 44 and 49 are incorporated herein.

Claim 53, Kouadio discloses creating a parametric texture map that comprises parameters for an equation that defines a surface structure in a manner in which the appearance of the surface structure includes surface reflectance properties wherein the equation models a Bidirectional Reflectance Distribution Function (col. 4, lines 7-67); rendering a digital image using the parametric texture map (real-time rendering; col. 3, line 66 through col. 4, line 3).

8. Claim 54 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kouadio (6,765,573) in view of Toh (5,537,494).

Claim 54, Kouadio teaches sampling surface reflectance data and determining at least one coefficient of the parametric texture map based at least in part on the sampled surface reflectance data (col. 14, lines 1-6); Kouadio does not teach performing a least squares fit algorithm to the sampled surface reflectance data. However, Toh teaches a least square fitting by numerical algorithm (col. 4, line 66 through col. 5, line 5). It would

have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the least squares fit algorithm taught by Toh into a texture map of Kouadio's teaching for proving surface reflectance to radiance environment map, because it would provide a method of encoding image data, smoothing initial image data to suppress noise and fitting a continuous equation to image intensity profile portions (col. 3, lines 13-17).

Allowable Subject Matter

9. Claims 1-18 and 52 allowed.

The following is an examiner's statement of reasons for allowance:

The prior art does not teach creating a parametric texture map that comprises parameters for an equation that defines a homogeneous surface structure in a manner in which the appearance of the surface structure includes surface reflectance properties, wherein said parametric texture map does not include variables representing surface position.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Response to Arguments

10. Applicant's arguments with respect to claims have been considered but are moot in view of the new ground(s) of rejection.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kimbinh T. Nguyen whose telephone number is (571) 272-7644. The examiner can normally be reached on Monday to Thursday from 7:00 AM to 4:30 PM. The examiner can also be reached on alternate Friday from 7:00 AM to 3:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ulka Chauhan can be reached at (571) 272-7782. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

September 26, 2005

KIMBINH T. NGUYEN
PRIMARY EXAMINER